

# Comparison of Public Health Assessments and Risk Assessments

<i>Issue</i>	<i>Public Health Assessments (PHA)</i>	<i>Risk Assessments (RA)</i>
<b>What it is:</b>	<ul style="list-style-type: none"> <li>■ A process to evaluate exposure to chemicals in the environment and the impact of those exposures on public health</li> <li>■ It defines likely exposure pathways and potentially exposed populations to address community health concerns</li> <li>■ It recommends actions to protect public health</li> </ul>	<ul style="list-style-type: none"> <li>■ A process to provide risk managers and the community with an understanding of the potential human health risk posed by a site in the absence of any cleanup</li> <li>■ A transparent assessment process for making consistent remedial decisions that are protective of human health and ecological receptors</li> <li>■ It estimates unacceptable risks as defined by regulatory standards and requirements</li> </ul>
<b>What it is not:</b>	<ul style="list-style-type: none"> <li>■ A medical evaluation</li> <li>■ A health study</li> <li>■ A regulatory document</li> <li>■ An evaluation of ecological risks</li> </ul>	<ul style="list-style-type: none"> <li>■ A prediction of the likely health effects from exposure</li> <li>■ A document containing public health recommendations</li> </ul>
<b>Data / Information Used</b>	<ul style="list-style-type: none"> <li>■ Environmental &amp; biologic data</li> <li>■ Community health concerns</li> <li>■ Health effects data (i.e., epidemiological, toxicological, and health outcome data)</li> <li>■ Site-specific exposure considerations</li> <li>■ Health guidelines to screen for chemicals needing further evaluation</li> </ul>	<ul style="list-style-type: none"> <li>■ Environmental data</li> <li>■ Remedial goals</li> <li>■ Toxicity data</li> <li>■ Default and site specific exposure assumptions</li> <li>■ Regulatory guidelines to determine unacceptable risk that need to be addressed through remediation</li> </ul>



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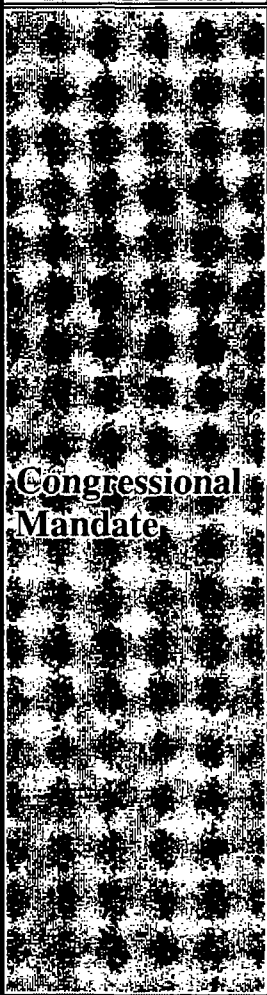
<b>Issue</b>	<b>Public Health Assessments (PHA)</b>	<b>Risk Assessments (RA)</b>
<b>Health Guidelines Used</b>	<p>For Screening:</p> <ul style="list-style-type: none"> <li>■ Minimal Risk Levels (MRLs)</li> <li>■ Reference Doses (RfDs)</li> <li>■ Reference Concentration (RfCs)</li> <li>■ <math>10^{-6}</math> cancer risk</li> </ul>	<p>To Determine Unacceptable Risk:</p> <ul style="list-style-type: none"> <li>■ RfDs</li> <li>■ RfCs</li> <li>■ <math>10^{-4}</math> to <math>10^{-6}</math> cancer risk</li> <li>■ Cancer Slope Factors</li> </ul>
<b>Findings</b>	<ul style="list-style-type: none"> <li>■ Identify actual chemical and radiological exposures to environmental contamination</li> <li>■ Assess real or perceived site-related health problems</li> <li>■ Focus on the past, the present and the future</li> <li>■ Recommend measures to prevent or reduce exposure</li> <li>■ Develop mechanisms to re-evaluate public health issues as site conditions change</li> <li>■ Recommend health-based follow-up actions</li> </ul>	<ul style="list-style-type: none"> <li>■ Calculate reasonable maximum exposures to derive cleanup goals that are protective of sensitive populations and ecological endpoints</li> <li>■ Establish site-specific cleanup goals</li> <li>■ Focus on the present and the future</li> </ul>
<b>Outcome / Endpoint</b>	<ul style="list-style-type: none"> <li>■ Reduce exposures</li> <li>■ Fill data gaps (via sampling or research)</li> <li>■ Health Studies</li> <li>■ Health Education</li> <li>■ Exposure Registries</li> <li>■ Address community concerns</li> <li>■ Leverage public and private partnerships to implement public health actions</li> </ul>	<ul style="list-style-type: none"> <li>■ Support for regulatory decisions (based on human and ecological risks)</li> </ul>

*\*For a more detailed comparison, see  
 "A Citizen's Guide to Risk and Health Assessments at Contaminated Sites," November 2003.*

## Comparison of ATSDR Public Health Assessment vs. EPA Baseline Risk Assessment

Agency	ATSDR Division of Health Assessment and Consultation	EPA Office of Emergency and Remedial Response
Type of Assessment	Public Health Assessment	Baseline Risk Assessment  Formerly called Superfund Public Health Evaluation
Guidance Document	<i>Public Health Assessment Guidance Manual</i>	<i>Risk Assessment Guidance for Superfund (RAGS) – Volume I Human Health Evaluation Manual</i>

## Comparison of ATSDR Public Health Assessment vs. EPA Baseline Risk Assessment (continued)

Agency	ATSDR	EPA
 <p><b>Congressional Mandate</b></p>	<p><i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or "Superfund") as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA)</i></p> <p><i>Section 104(i)(6) Health Related Authorities</i></p> <p>The comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances.</p> <p>The comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure.</p> <p>The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies available from the Administrator of EPA.</p>	<p><i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or "Superfund") as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA)</i></p> <p><i>Section 121 Cleanup Standards</i></p> <p>(D) Short- and long-term potential for adverse health effects from human exposure.</p> <p>(G) The potential threat to human health and the environment associated with excavation, transportation, and redisposal, and containment.</p>

## Comparison of ATSDR Public Health Assessment vs. EPA Baseline Risk Assessment (continued)

Agency	ATSDR	EPA
<b>Exposures Evaluated</b>	<p>To evaluate site-specific exposure conditions about actual or likely past, current, and future exposures.</p> <p>May study existing health effects and whether they are related to past exposure.</p>	<p>Focuses on current and potential future exposures and considers all contaminated media regardless if exposure are occurring or are likely to occur.</p>
<b>Purpose</b>	<p>Qualitative, site specific, and focused on medical and public health perspective; contaminants discussed in terms of sensitive populations, mechanisms of toxic chemical action, and possible disease outcomes.</p>	<p>Quantitative, chemical-oriented characterizations that use statistical and biological models to calculate numerical estimates of risk to health.</p>
<b>Goal</b>	<p>To determine whether or not harmful health effects are expected from contaminants in the environment and to make recommendations for actions needed to protect public health, which may include issuing health advisories.</p>	<p>To provide a framework for developing the risk information necessary to assist decision-making at remedial sites. Provide information necessary to justify action at a site and to select the best remedy for the site.</p>



## Comparison of ATSDR Public Health Assessment vs. EPA Baseline Risk Assessment (continued)

Agency	ATSDR	EPA
<b>Objectives:</b>	<p>To determine the nature and extend of contamination from available information..</p> <p>To define potential human exposure pathways related to site-specific contaminants.</p> <p>To identify populations who may be or may have been exposed to environmental contaminants.</p> <p>To determine the public health implications of site-related exposures, through the examination of environmental and health effects data (toxicologic, epidemiologic, medical, and health outcome data).</p> <p>To address those public health implications by recommending relevant public health actions to prevent harmful exposures.</p> <p>To identify and respond to community health concerns and clearly communicate the findings of the assessment.</p>	<p>To help determine whether additional remedial response action is necessary at a site.</p> <p>To provide a basis for determining residual chemical levels that are adequately protective of health.</p> <p>To provide a basis for comparing potential health impacts of various remedial alternatives.</p> <p>To help support selection of the “no-action” remedial alternative.</p>



## Comparison of ATSDR Public Health Assessment vs. EPA Baseline Risk Assessment

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Agency	<b>ATSDR</b> <b>Division of Health Assessment and Consultation</b>	<b>EPA</b> <b>Office of Emergency and Remedial Response</b>
	<p><i>Section 104(i)(6) Health Related Authorities</i></p> <p>The comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances.</p> <p>The comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure.</p> <p>The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies available from the Administrator of EPA.</p>	<p><i>Section 121 Cleanup Standards</i></p> <p>(D) Short- and long-term potential for adverse health effects from human exposure.</p> <p>(G) The potential threat to human health and the environment associated with excavation, transportation, and redispisal, and containment.</p>





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
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Agency	ATSDR	EPA
<b>Exposures Evaluated</b>	<p>To evaluate site-specific exposure conditions about actual or likely past, current, and future exposures.</p> <p>May study existing health effects and whether they are related to past exposure.</p>	<p>Focuses on current and potential future exposures and considers all contaminated media regardless if exposure are occurring or are likely to occur.</p>
<b>Purpose</b>	<p>Qualitative, site specific, and focused on medical and public health perspective; contaminants discussed in terms of sensitive populations, mechanisms of toxic chemical action, and possible disease outcomes.</p>	<p>Quantitative, chemical-oriented characterizations that use statistical and biological models to calculate numerical estimates of risk to health.</p>
<b>Goal</b>	<p>To determine whether or not harmful health effects are expected from contaminants in the environment and to make recommendations for actions needed to protect public health, which may include issuing health advisories.</p>	<p>To provide a framework for developing the risk information necessary to assist decision-making at remedial sites. Provide information necessary to justify action at a site and to select the best remedy for the site.</p>

Agency	ATSDR	EPA
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## Screening and Regulatory Dose Limits

NRC regulation, public exposure—7,000 mrem over 70 years  
NCRP guidance, public exposure—7,000 mrem over 70 years



ATSDR radiogenic cancer comparison value,  
lifetime exposure—5,000 mrem over 70 years  
NRC regulation, worker exposure—5,000 mrem per year



ATSDR acute MRL for noncancer endpoints—400 mrem per event



NRC regulation, public exposure—100 mrem per year  
NCRP guidance, public exposure—100 mrem per year  
ATSDR chronic MRL, for noncancer endpoints, annual—100 mrem per year



EPA clean-up level, annual—15 mrem per year

### AVERAGE U.S. BACKGROUND—360 MREM PER YEAR

#### Natural Sources

200 mrem/year Radon  
40 mrem/year Natural internal  
30 mrem/year Terrestrial (from the earth)  
30 mrem/year Cosmic (from space)

#### Artificial Sources

50 mrem/year Medical  
10 mrem/year Consumer products  
<1 mrem/year Nuclear power

The average background in Denver, Colorado, is 600 mrem per year.

### LOG SCALE



## Estimated Doses for Scarboro and Typical Doses From Ionizing Radiation Sources

Doses below 5,000 mrem over 70 years are not expected to result in harmful health effects in exposed people. Doses above 5,000 mrem are further evaluated by ATSDR to determine the potential for harmful health effects to occur.

2,500 mrem for each test—Nuclear medicine stress test

1,000 mrem for each scan—CT scan



155 mrem over 70 years—Total past radiation dose for Scarboro



### ACRONYMS

ATSDR: Agency for Toxic Substances and Disease Registry  
EPA: U.S. Environmental Protection Agency  
NCRP: National Council on Radiation Protection and Measurements  
NRC: Nuclear Regulatory Commission  
MRL: minimal risk level  
mrem: millirem (1,000 mrem = 1 rem)

<1 mrem over 70 years—Current radiation dose for Scarboro



*Handwritten notes:*  
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# Screening & Regulatory Dose Limits

## ATSDR Response to Comments on Dose Screening Criteria Used in the Public Health Assessment for the Y-12 Uranium Releases

The ATSDR radiogenic cancer comparison value of 5,000 millirem (mrem) over 70 years is based on peer-reviewed literature and other documents developed to review the health effects of ionizing radiation. On an annual basis, this comparison value is consistent with recommendations of other organizations. The first approximation of the ICRP and NCRP recommended dose limit of 100 mrem/year for public exposure roughly equates to a dose of 7,000 mrem over 70 years. Thus, ATSDR's radiogenic cancer comparison value of 5,000 mrem over 70 years is less than the ICRP and NCRP guidelines for the maximum dose limit for exposure to the public.

Agency	Lifetime dose (mrem over 70 years)	Yearly dose (mrem/year)
NRC regulations 10 CFR 20.1201 (worker exposure)	<i>Not applicable</i>	5,000
NRC regulation (public exposure)	7,000	100
ICRP guidance (public exposure)	7,000	100
NCRP guidance (public exposure)	7,000	100
ATSDR radiogenic cancer comparison value	5,000	71
EPA clean-up level*	<i>Not applicable</i>	15

\* EPA CERCLA guidance (OSWER No. 9200.4-18, August 1997) states that 15 mrem/year effective dose equivalent equates to approximately  $3 \times 10^{-4}$  increased lifetime risk (the upper bound of the risk range).

### ATSDR

Agency for Toxic  
Substances and  
Disease Registry

### EPA

Environmental  
Protection Agency

### ICRP

International  
Commission on  
Radiological  
Protection

### NCRP

National Council  
on Radiation  
Protection and  
Measurements

### NRC

Nuclear  
Regulatory  
Commission

ATSDR's radiogenic cancer comparison value is used as a screening tool. If a screening evaluation indicates that past or current doses exceeded this value, additional in-depth health evaluation is conducted.

- The *past* annual dose of 2 mrem/year (155 mrem over 70 years) calculated for Scarboro residents is more than 35 times less than the ATSDR radiogenic cancer comparison value, 50 times lower than ICRP and NCRP guidelines and the NRC regulation for public exposure, and more than 7 times less than EPA's clean-up level.
- The *current* annual dose <1 mrem/year (<1 mrem over 70 years) calculated for Scarboro residents is more than 71 times less than ATSDR's radiogenic cancer comparison value, more than 100 times lower than the ICRP and NCRP guidelines and the NRC regulation for public exposure, and more than 15 times less than EPA's clean-up level.

The figure on the back graphically displays the doses estimated for Scarboro in relation to ATSDR's radiogenic cancer comparison value, NCRP's guidance, NRC's regulations, EPA's clean-up level, and the average background doses from ionizing radiation sources in the United States.